

SECTION C

THE COOLING SYSTEM

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DESCRIPTION

The cooling system is pressurized and the water circulation is assisted by a pump attached to the front of the engine and driven by a belt from the crankshaft pulley. A relief valve is incorporated in the radiator filler cap which controls the pressure at approximately 4 lb./sq. in. ($\cdot 28$ kg./cm.²).

The water circulates from the base of the radiator and passes round the cylinders and cylinder head, reaching the header tank of the radiator via the thermostat and top hose. From the header tank it passes down the radiator core to the base tank of the radiator. Air is drawn through the radiator by a fan attached to the water pump pulley.

Section C.1**THERMOSTAT**

For maximum efficiency the engine operating temperature is maintained within certain limits by a bellows-type thermostat fitted in the water outlet at the front of the cylinder head.

When the engine is cold this valve is closed, and when the engine is started the flow of water to the radiator is temporarily restricted. Due to this, the temperature of the water in the cylinder head and cylinder jackets will quickly rise, thus ensuring rapid warming up. The heat so generated will gradually expand the bellows, so opening the valve and ultimately permitting a full flow of water to the radiator.

The thermostat is detachable.

A small hole drilled in the head of the valve provides a by-pass to cope with any expansion of the cooling water. When the system has been completely drained it is essential, when refilling, to allow sufficient time for any trapped air to escape through the by-pass hole in the valve before finally topping up.

The thermostat opening is set by the manufacturer and cannot be altered. It opens at a temperature of 70 to 75° C. (158 to 167° F.). During decarbonizing it is policy to test this opening by immersing the thermostat in water raised to the requisite temperature. The valve should open under these conditions, but if it fails to open a new unit must be fitted.

Section C.2**REMOVING THE FILLER CAP**

The cooling system is under pressure while the engine

is hot, and the radiator filler cap must be removed very carefully or left in position until the water has cooled.

If it is necessary to remove the filler cap when the engine is hot it is absolutely essential to release the cap gradually, and the filler spout is provided with a specially shaped cam to enable this to be done easily.

Unscrew the cap slowly until the retaining tongues are felt to engage the small lobes on the end of the filler spout cam, and wait until the pressure in the radiator is fully released before finally removing the cap.

It is advisable to protect the hand against escaping steam while removing the cap.

Section C.3**DRAINING THE COOLING SYSTEM**

Remove the radiator header tank filler cap.

Open the two drain taps. One is fitted at the rear of the cylinder block on the right-hand side and the other at the base of the radiator. If anti-freeze mixture is being used it should be drained into a suitable container and carefully preserved for future use.

In the event of a drain tap becoming clogged it is advisable to remove the tap completely from the cylinder block or radiator and then remove any foreign matter. The use of stiff wire to dislodge any obstruction would prove ineffective as the construction of the taps is such as to prevent complete penetration behind them.

When the system is completely drained and refilling is to be deferred until some later date a suitable notice should be fixed to the front of the radiator, indicating that the coolant has been drained. As an alternative, place the radiator filler cap on the driver's seat or leave the bonnet propped open as a reminder to fill the cooling system before the car is used again.

NOTE.—If a heater is fitted, under no circumstances should draining of the cooling system be resorted to as an alternative to the use of anti-freeze, due to the fact that complete draining of the heater unit by means of the cooling system drain taps is not possible.

Flushing the radiator

To ensure efficient circulation of the coolant and to reduce the formation of scale and sediment in the radiator the system should be periodically flushed out with clear running water, preferably before putting in anti-freeze and again after taking it out.

The water should be allowed to run through until it comes out clear from the taps.

This method is adequate under normal conditions, but in extreme cases where excessive 'furring up' is experienced a more efficient method is to completely remove the radiator and flush in the reverse way to the flow, i.e. turn the radiator upside-down and let the water flow in through the bottom hose and out of the top connection.

Section C.4

FILLING THE COOLING SYSTEM

Close the radiator and cylinder block drain taps.

Ensure that all hose connections are tight.

Fill up the system through the filler in the radiator header tank until the level of water can just be seen. Run the engine until it is hot and then add sufficient water to raise the level to within 1 in. (25.4 mm.) of the bottom of the filler neck.

When possible soft water, such as clean rain-water, should be used to fill the system.

When using anti-freeze avoid overfilling and prevent loss due to expansion. Screw the filler cap firmly into position.

The cooling system is unsuitable for use with anti-freeze mixtures having an alcohol base owing to the high temperatures attained in the top tank. Only anti-freeze mixtures of the ethylene glycol or glycerine type should be employed. (See Section C.5.)

Section C.5

COLD WEATHER PRECAUTIONS

As the cooling system is sealed, relatively high temperatures are developed in the radiator upper tank. For

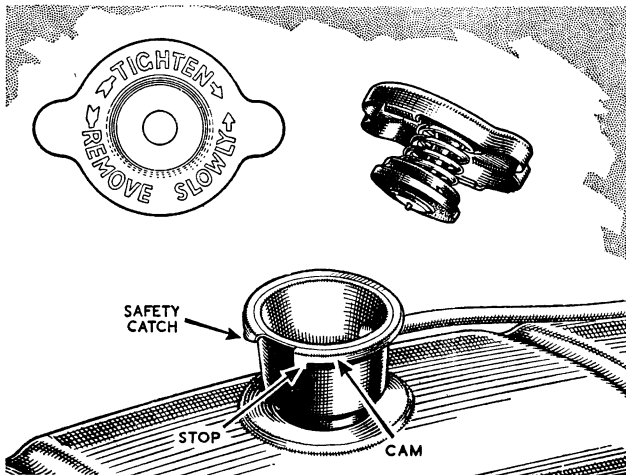


Fig. C.1

Showing the radiator filler cap retaining cam, stop, and safety catch

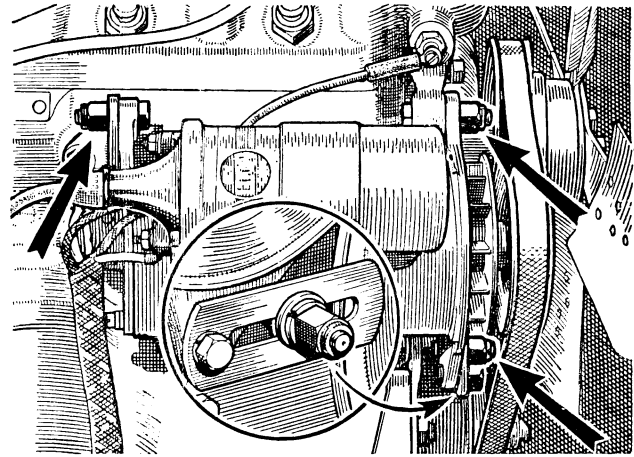


Fig. C.2

The dynamo mounting bolts which must be slackened for belt tension adjustment

this reason anti-freeze solutions having an alcohol base are unsuitable owing to their high evaporation rate producing rapid loss of coolant and a consequent interruption of the circulation of coolant.

Only anti-freeze of the ethylene glycol or glycerine type is suitable for use in the cooling system and recommended makes are Smiths Bluecol, Filtrate Nevafreze, Shell Snowflake, or Esso Anti-freeze.

The correct quantities of anti-freeze for different degrees of frost resistance are given here:

Down to 7° F. (-14° C.) 15% solution	Down to 0° F. (-18° C.) 20% solution
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Where temperatures below 0° F. (-18° C.) are likely to be encountered a solution of at least 25 per cent. of anti-freeze must be used to ensure immunity from trouble. Consult your local Dealer on this matter.

Before introducing anti-freeze mixture to the radiator it is advisable to clean out the cooling system thoroughly by swilling out the passages with a hose inserted in the filler cap, keeping the drain taps open. Only top up when the cooling system is at its normal running temperature, in order to avoid losing anti-freeze due to expansion.

Make sure that the cooling system is water-tight and examine all joints, replacing any defective rubber hose with new.

The capacity of the cooling system may be found in 'GENERAL DATA'.

Section C.6

FAN AND DYNAMO BELT ADJUSTMENT

To fit a new fan belt slacken slightly the two bolts on which the dynamo pivots and release the bolt securing

it to the slotted link and the nut securing the slotted link to the engine. Move the dynamo to the engine as far as possible. Slide the belt over the fan and onto the fan pulley; ease the belt onto the crankshaft pulley and dynamo pulley. It may be found helpful to turn the engine with the starting handle whilst easing the belt over the dynamo pulley.

Adjustment is made by raising the dynamo upwards away from the engine. A **gentle hand pull only must be exerted on the dynamo, or the belt tension will be excessive and undue strain will be thrown onto the dynamo bearings.** Tighten up the bolts with the dynamo in this position. The belt should be sufficiently tight to prevent slip, yet it should be possible to move the belt laterally 1 in. (2.5 cm.) in the centre of its longest run.

Section C.7

REMOVING THE WATER PUMP

Drain the water from the cooling system by opening the two drain taps as described in Section C.3; remember to collect the water for re-use if it contains anti-freeze.

Release the clips on the top and bottom water hoses,

detaching the bottom hose from the connection on the water pump.

Remove the radiator as detailed in Section CC.

Disconnect the dynamo leads, remove the dynamo attachment bolts, and take off the dynamo.

Take out the four bolts securing the fan and pump assembly to the front of the cylinder block and withdraw the assembly.

Replacement of the fan and pump assembly is a reversal of this procedure, but care must be taken to see that the joint gasket between the pump body and the cylinder block is in good condition. It is always advisable to fit a new gasket.

Section C.8

DISMANTLING AND REASSEMBLING THE WATER PUMP

When the fan and water pump assembly has been removed from the engine, as indicated in Section C.7, the water pump may be dismantled for attention in the following way:

Unscrew the four set bolts which attach the fan and

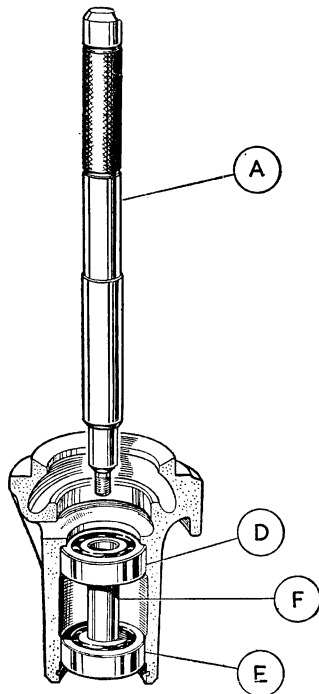


Fig. C.3

This cut-away view of the water pump shows the special driver about to enter the rear bearing for removal. The rear bearing felt and retainers are not shown here

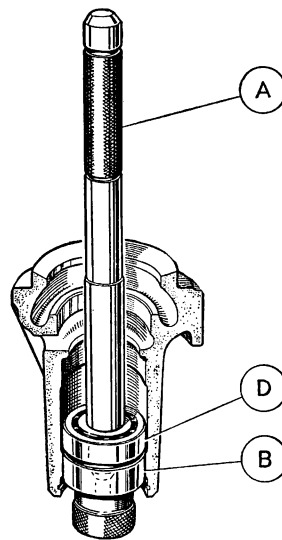


Fig. C.4

Here the dummy front bearing is in position and the driver is screwed into it. This is the method of removing the rear bearing

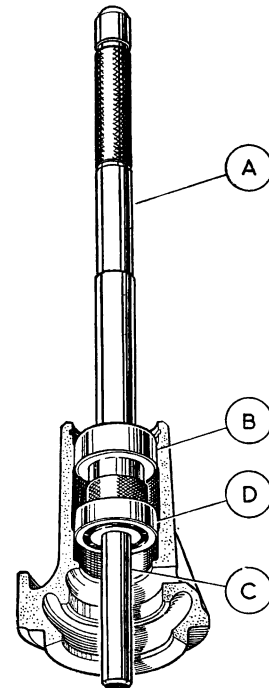


Fig. C.5

When reassembling the pump use the tool assembled as shown and thread the rear bearing onto the pilot with the felt ring and retainers. (Felt and retainers not shown here)

belt pulley to the hub, and remove the fan blades and pulley.

Unscrew the nut and spring washer from the end of the pump spindle and pull off the fan hub with a suitable extractor.

Remove the Woodruff key from the spindle and remove any burrs from the keyway. Withdraw the dished oil seal washer after removing its circlip.

Gently tap the pump spindle rearwards out of the pump body. Withdraw the sealing gland.

The withdrawal of the ball races is assisted by the use of special tool 18G60, which comprises three parts: the driver (A) (Fig. C.3), dummy front bearing (B) (Fig. C.4), and the pilot (C) (Fig. C.5). It is designed to remove and replace the water pump bearings without damage to the pump body.

Support the pump body with the front end downwards.

Insert the driver (A) (Fig. C.3) into the rear bearing (D) and tap downwards until the front bearing (E) and the distance piece (F) are released.

Position the dummy front bearing in the pump body and screw the driver into it (Fig. C.4). The rear bearing is now aligned with the housing bore and may be tapped out and the felt washer and retainers removed.

Reassembling

Support the body with the rear end downwards.

Assemble the driver, dummy front bearing, and pilot (C). Position the rear bearing, the felt ring inner retainer, the felt ring, and the outer retainer, in that order, on the pilot and press them into the pump body (Fig. C.5). Use a new felt ring if the old one is damaged.

Position the distance tube and front bearing on the pilot and press the bearing into the pump body.

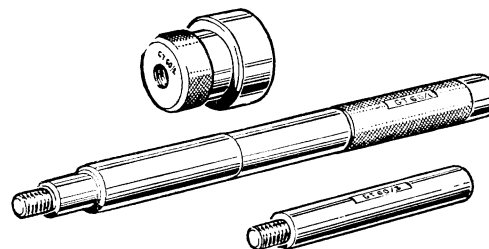
The rest of the assembly procedure is a reversal of the dismantling sequence but care must be taken to see that the seal assembly is in good condition before proceeding. If it shows signs of damage a new seal must be fitted.

Repack the pump with grease to Ref. C.

SPECIAL TOOLS

18G60. Water Pump Bearing Remover and Replacer

This tool consisting of three parts, a driver, dummy front bearing, and a pilot, will ensure that the rear bearing is removed and replaced without damage to the pump body.



18G60

18G187. Radiator Reverse-flush Adaptors

These adaptors should be used in pairs, one for the radiator inlet hose and one for the outlet hose. The brass inlet pipe is 1 in. (25.4 mm.) in diameter. This is the size of the water mains supply hose generally used; if there is any variation a reducing sleeve can be used.



18G187

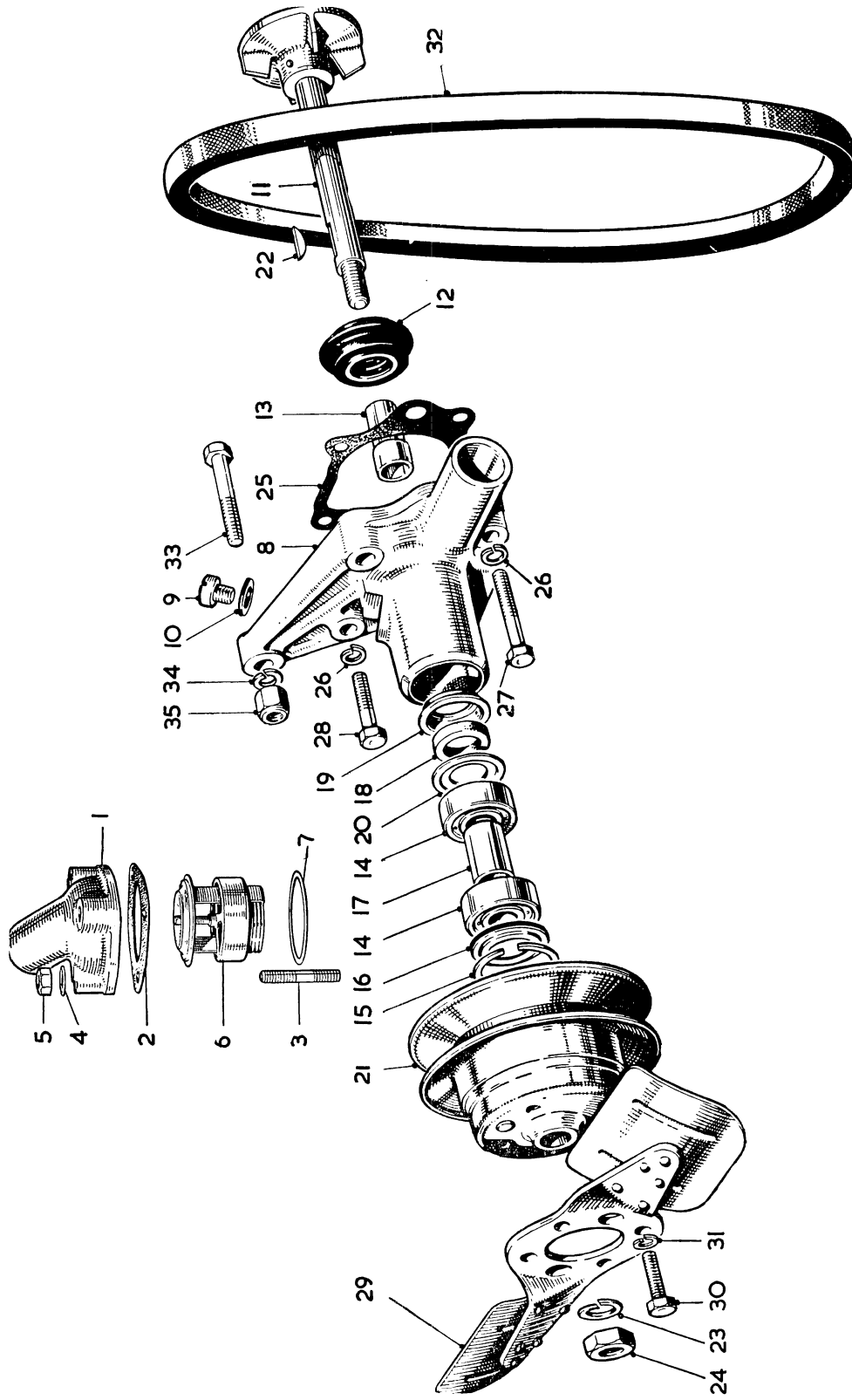
SECTION CC

THE COOLING SYSTEM

This Section is a Supplement to Section C

	<i>Section</i>
Engine drain tap—modified	CC.3
Radiator—removing and replacing	CC.1
Water pump—modified	CC.2

THE WATER PUMP, FAN, AND THERMOSTAT COMPONENTS



KEY TO THE WATER PUMP, FAN, AND THERMOSTAT COMPONENTS

<i>No.</i>	<i>Description</i>	<i>No.</i>	<i>Description</i>
1.	Elbow—water outlet.	19.	Retainer—felt washer inner.
2.	Joint—elbow.	20.	Retainer—felt washer outer.
3.	Stud—elbow to cylinder.	21.	Pulley—water pump.
4.	Washer for stud.	22.	Key for pulley.
5.	Nut for stud.	23.	Spring washer.
6.	Thermostat.	24.	Nut—pulley to spindle.
7.	Joint—thermostat.	25.	Joint—pump to block.
8.	Body.	26.	Spring washer.
9.	Plug.	27.	Set screw—long—to block.
10.	Washer for plug.	28.	Set screw—short—to block.
11.	Spindle with vane.	29.	Fan (two fitted).
12.	Seal.	30.	Set screw—fan to pulley.
13.	Distance piece—gland.	31.	Spring washer.
14.	Bearing.	32.	Fan belt—wedge-type.
15.	Spring ring—bearing.	33.	Bolt—dynamo to water pump body.
16.	Grease retainer—bearing.	34.	Spring washer.
17.	Distance piece—bearings.	35.	Nut for dynamo bolt.
18.	Washer—felt.		

Section CC.1

REMOVING AND REPLACING THE RADIATOR

Drain the water from the cooling system as in Section C.3.

Release the clips from the top and bottom water hoses and detach the hoses from their connections.

Remove the four nuts, bolts, spring and plain washers securing each side of the radiator to the body, noting that the air inlet duct is secured by two of these bolts on the right-hand side. Lift out the radiator.

Replacement of the radiator core is a reversal of the above procedure but do not omit to secure the air inlet duct to the right side.

Close the drain taps and refill the system until the surface of the coolant is 1 in. (25.4 mm.) below the bottom of the filler neck.

Section CC.2

MODIFIED WATER PUMP

Commencing at Engine No. 15R/U/H715, a modified water pump is fitted which incorporates a one-piece bearing. The pump is interchangeable with the original, but only as a complete unit.

Removing

Remove the radiator as detailed in Section CC.1.

Remove the dynamo attachment and take off the dynamo.

Unscrew the four bolts attaching the pump assembly to the front of the cylinder block and remove the fan and pump assembly.

Replacement of the fan and pump assembly is a reversal of the above procedure.

Dismantling

Unscrew the four set bolts which attach the fan and belt pulley to the hub and remove the fan and pulley.

Remove the fan hub with a suitable extractor.

Pull out the bearing locating wire through the hole in the top of the pump body.

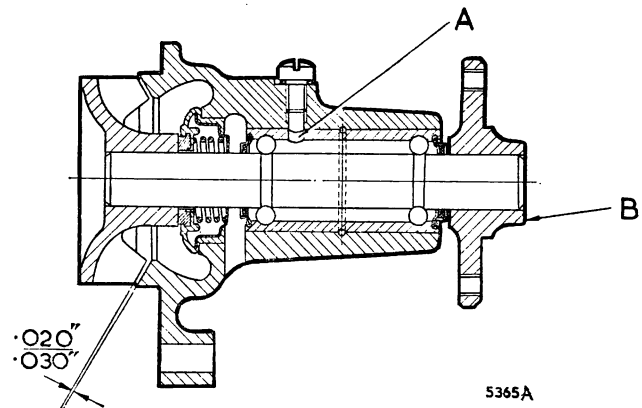


Fig. CC.1

A section through the later-type water pump showing the components. When assembled, the hole in the bearing (A) must coincide with the lubricating hole in the water pump, and the face of the hub (B) must be flush with the end of the spindle

Gently tap the pump bearing assembly rearwards out of the pump body. This will release the combined bearing and spindle assembly, together with the seal and vane.

Remove the vane from the bearing assembly with a suitable extractor and remove the pump seal assembly.

Reassembly is a reversal of the dismantling procedure, but care must be taken to see that the seal assembly is in good condition. If there is any sign of damage the seal should be replaced by a new component. When the bearing assembly is assembled into the pump the hole in the bearing (A) must coincide with the lubricating hole in the pump body.

Section CC.3

MODIFIED ENGINE DRAIN TAP

Commencing at Engine No. 15R/U/H3477, a cylinder block drain tap (Part No. 3H576) of improved design is fitted. This tap is introduced to overcome any difficulty of operation and has a plain British Standard Pipe thread in place of the taper thread previously used. A fibre washer (Part No. 2K4954) must, therefore, be fitted between the cylinder block and the tap.

The new tap is interchangeable with that previously used.